Issues with Proposed Intelligent Reserve Deployment

OC

IMM

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Monitoring Analytics

Issues with IRD Proposal

- **The IRD SCED solution is a significant change from PJM practice for market dispatch.**
  - **Converts inflexible synchronized reserves to energy.**
- **Does not allow reserves converted to energy to set price.**
- **IRD may trigger shortage pricing and dispatch units based on events that are assumed and not actual.**
- **IRD should be reviewed through the stakeholder process, including the MIC, as a change to the OA and manuals.**
- **Analysis needed to determine if it is an improvement over status quo.**

Background

- **PJM deploys synchronized reserves (synchronized reserve event) via the PJM All Call.**
- **PJM deploys 100 percent of all synchronized reserves although it has the ability to load a different percentage (25, 50 or 75 percent) (Manual 12, Section 4.1.2)**
- **This deployment is done outside of RT SCED.**
- **RT SCED reflects the cause of the spin event only after it is incorporated in the state estimator results.**

IRD Proposal

- **RT SCED currently solves three scenarios with high, medium and low load bias. Load bias is the only difference among the scenarios.**
- **IRD would be a fourth scenario that increases the load forecast for the RTO by the MW output of the largest contingency.**
- **Approval of the IRD case would become an additional way that PJM declares a synchronized reserve event, converting reserves to energy.**
- **The All Call would still be in place in Phase 1.**

Cause of Spin Event Matters

- **Not all spin events are caused by the loss of a unit.**
- **In Jan-Jul 2020, three spin events were caused by low ACE.**
- **Low ACE events are not sudden events like unit trips.**
- **The IRD case will not accurately simulate a low ACE.**
- **PJM already tends to positively bias load during low ACE events.**

Load Bias

- **The IRD case load bias will be the same as the mid scenario from the three existing RT SCED scenarios.**
- **The IRD case will be correct only if the mid scenario bias is still accurate.**

IRD and SCED Issues

- **RTSCED cases are currently executed every five minutes. RTSCED cases take 2 to 4 minutes from execution to approval.**
- **When the state estimator captures the lost MW, a normal RT SCED case should be used.**
- **No need for an IRD case.**
- **Under PJM's short term SCED/LPC process, prices will not reflect spin event for first five minutes.**
- **The intended outcome of reflecting dispatch of reserves in prices cannot be realized due to the lag in the use of the approved IRD solution in LPC.**

Sep 9, 2020, Spin Event

- **At 20:19 on Sep 9, 2020, PJM declared an RTO spin event for the loss of roughly 1,000 MW in PSEG.**
- **The MW were lost between 20:13 and 20:15.**
- **At the time the spin event was declared, PJM had solved RT SCED cases that reflected the lost MW. Those cases were solved around 20:17:30.**
- **None of the available RT SCED solutions showing the unit trips were approved.**

Sep 9, 2020, Spin Event

- **The example IRD case that solved at 20:17 would reflect (accounting for PJM IRD design updates):**
  - **The loss of the roughly 1,000 MW.**
  - **Increased RTO demand by 1,600 MW.**
  - **Operator load bias of 500 MW (mid case bias).**
- **The net supply called by the IRD case to meet power balance was 2,600 MW.**
  - **1,600 + 1,000**
  - **IRD would have called for more than twice the amount of MW lost.**

Sep 9, 2020, Spin Event – RT SCED Cases

Case Type	SE Data Timestamp	RTSCED Execution Time	RTSCED Solution Time	RTSCED Approved Time	Load Bias	Simple Average Generation LMP
Mid	20:13:00	20:13:49	20:15:27	20:16:23	500	119
Low	20:13:00	20:13:49	20:15:20		0	27
High	20:13:00	20:13:49	20:15:23		1,000	1,794
IRD	20:13:00	20:13:49	20:15:24		1,610 (DOM Only)	1,799
Mid	20:15:00	20:16:00	20:17:35		500	643
Low	20:15:00	20:16:00	20:17:41		0	45
High	20:15:00	20:16:00	20:17:36		1,000	1,857
IRD	20:15:00	20:16:00	20:17:39		1,611 (DOM Only)	1,823
Mid	20:21:00	20:22:18	20:23:44	20:25:56	300	62
Low	20:21:00	20:22:18	20:23:38		(200)	25
High	20:21:00	20:22:18	20:23:41		800	644
IRD	20:21:00	20:22:18	20:23:38		1,609 (DOM Only)	1,826

Spin Events

- **PJM's data shows ACE overshoots towards the end of spin events.**
- **PJM's metric for Tier 1 performance indicates low response.**
- **Contradictory data points.**
- **Data, including settlements data, indicate that response is from other Tier 1 resources that did not clear as synchronized reserve.**
  - **Due to manual deselection of certain resources.**
  - **DGP adjusts tier 1 available MW down.**
- **If issue is inaccurate modeling, address it directly.**

More Analysis Needed

- **An RT SCED deployment of reserves is a desirable goal.**
- **The intelligent deployment of reserves should be based on facts.**
- **Intelligent deployment of reserves means providing dispatch instructions according to economic dispatch to cover MW lost in the location where they were lost.**
- **The IRD proposal does not achieve that.**
- **Inaccurate dispatch signals, and prices based on these signals may not align prices with reliability requirement.**

MMU Recommendations

- **PJM updates to design reduced the level of inaccuracy compared to original design.**
- **Analysis is needed to determine if proposal would be an improvement over status quo.**
- **Define a six month period for a phase 1 pilot to test IRD.**
- **Begin phase 1 pilot only after long term SCED and LPC reforms are implemented.**
- **Do not operate pilot during peak winter or summer conditions.**
- **Define metrics in advance for evaluating results.**

Monitoring Analytics, LLC
2621 Van Buren Avenue
Suite 160
Eagleville, PA
19403
(610) 271-8050

MA@monitoringanalytics.com
www.MonitoringAnalytics.com